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[Claim(s)]

[Claim 1]A case member which has a combustion gas inlet and a combustion gas exhaust port.
A lamination type heat exchanger of structure which was allocated inside this case member and laminated two or more channel formation boards.
It is the clearance sealing structure of a heat exchange apparatus provided with the above, a blocking plate which takes up between a case member and lamination type heat exchangers was formed, and a comb tooth-form shaped part which formed two or more protrusion pieces projected into a slot of plurality of a peripheral part of a lamination type heat exchanger to the lamination type heat-exchanger side of said blocking plate in the shape of **** was provided.

[Claim 2]A case member which has a combustion gas inlet and a combustion gas exhaust port.
A lamination type heat exchanger of structure which was allocated inside this case member and laminated two or more channel formation boards.
Are the clearance sealing structure of a heat exchange apparatus provided with the above, and two or more blocking plates which take up between a case member and lamination type heat exchangers are formed, A comb tooth-form shaped part which formed in the lamination type heat-exchanger side of two or more blocking plates two or more protrusion pieces projected into a slot of plurality of a peripheral part of a lamination type heat exchanger in the shape of **** was provided, respectively.

[Claim 3]Clearance sealing structure of the heat exchange apparatus according to claim 2, wherein said two or more blocking plates are allocated so that it may be located in a position from which it was allocated by the state where two or more comb tooth-form shaped parts

stuck selectively at least, and at least two comb tooth-form shaped parts shifted to a laminating direction of said channel formation board.
[Claim 4]Clearance sealing structure of the heat exchange apparatus according to claim 1 characterized by comprising the following.
Two or more slits located between protrusion pieces of plurality [blocking plate / said] of said comb tooth-form shaped part.
Two or more flections which are two or more flections formed in a slit and parallel at a position on extension of a slit of these plurality, and were crooked to the opposite side by turns.

[Claim 5]Clearance sealing structure of the heat exchange apparatus according to claim 2 or 3, wherein at least one of said two or more blocking plates comprises a thin metal plate in which elastic deformation is possible at the time of gas pressure increase of combustion gas.
[Claim 6]A case member which has a combustion gas inlet and a combustion gas exhaust port.
A lamination type heat exchanger of structure which was allocated inside this case member and laminated two or more channel formation boards.
Are the clearance sealing structure of a heat exchange apparatus provided with the above, and a blocking plate which takes up between a case member and lamination type heat exchangers in order to prevent combustion gas's bypassing a lamination type heat exchanger, and flowing into a combustion gas exhaust port is formed, It is a coiled spring which can be elongated to a laminating direction of said channel formation board, a coiled spring which plugs up mostly two or more slots of a peripheral part of said lamination type heat exchanger in the shape of airtightness was formed, and a tip part by the side of a lamination type heat exchanger of said blocking plate was made to contact said coiled spring.

[Detailed Description of the Invention]
[0001]
[Field of the Invention]Especially this invention prevents combustion gas's bypassing a lamination type heat exchanger, and flowing into the exterior about the clearance sealing structure of a heat exchange apparatus, and relates to what has possible raising the heat exchanging efficiency of a heat exchange apparatus.
[0002]
[Description of the Prior Art]Although it is provided in various burning appliances, such as hot water supply equipment, from before and the thing of various form is used for the heat

exchange apparatus which heats fluid, such as warm water, with the hot combustion gas emitted by the burner, For example, there are some which equipped the inside with the lamination type heat exchanger of the structure which laminated two or more channel formation boards which have a channel. It can be constituted compactly, this lamination type heat exchanger securing a required heat transfer area, and it becomes possible to miniaturize a heat exchange apparatus.

[0003]while the combustion gas introduced into the inside of the case member which accommodates a lamination type heat exchanger in this heat exchange apparatus heats flowing fluid for the channel of two or more channel formation boards -- these channel formation -- it passes along a wooden floor and is discharged from the combustion gas exhaust port of a case member in the exterior of a heat exchange apparatus. Although not avoided, if combustion gas bypasses a heat exchanger from this crevice and it flows into a combustion gas exhaust port, here, [that a crevice is made on manufacture of a heat exchange apparatus between a case member and a lamination type heat exchanger] Since a part of combustion gas will be discharged outside, without performing fluid and heat exchange, heat exchanging efficiency will fall considerably.

[0004]For this reason, although a certain means needs to close this crevice, since a lamination type heat exchanger is the structure which laminated two or more channel formation boards, two or more slots will be inevitably formed in the peripheral part of a lamination type heat exchanger with the channel formation board of these plurality as mentioned above. However, it does not comprise a conventional lamination type heat exchanger so that it may close to such a slot, but a part of combustion gas will bypass a lamination type heat exchanger from a slot, it will be discharged outside, and there was a problem that heat exchanging efficiency fell.

[0005]As this measure, plugging up a slot with the sealing member made of a synthetic resin is thought out easily first. In order to form the blocking plate which closes the crevice between a case member and a heat exchange apparatus and to also plug up said two or more slots in the shape of airtightness, So that the comb tooth-form shaped part which formed two or more protrusion pieces in the shape of **** mostly may be provided in the tip end part by the side of the lamination type heat exchanger of a blocking plate and combustion gas may be prevented from flowing out of a slot into a combustion gas exhaust port, Constituting so that two or more protrusion pieces of a comb tooth-form shaped part may be made to project in two or more slots, respectively and two or more slots may be plugged up etc. is considered.

[0006]

[Problem to be solved by the invention]However, when it constitutes so that a sealing member may close a slot and is a latent-heat-recovery type heat exchange apparatus with a heat exchange apparatus able to collect the latent heat of steam in combustion gas, steam condenses inside a case member and water is generated, but. Since this flocculated water

contains the nitrogen oxides in combustion gas, and SOx, it shows acidity. Therefore, the sealing member which plugs up a slot must use the thing of the high construction material of corrosion resistance, and is disadvantageous in manufacturing cost.
[0007]When it constitutes so that the comb tooth-form shaped part of a blocking plate may close a slot, [the width of two or more slots] If it is not necessarily fixed from factors, such as a manufacturing error, and the width of two or more protrusion pieces made to project in two or more slots, respectively is formed so that it may become almost the same as the width of a slot, Since a protrusion piece is made to project in a slot and it becomes impossible to plug up a slot when the width of two or more slots varies, it is necessary to form the width of a protrusion piece more narrowly than the width of a slot.
[0008]However, the thing which can stop the quantity of the combustion gas which flows out of a slot few with a protrusion piece if it compares when not plugging up a slot at all in this case, Since it cannot prevent thoroughly combustion gas bypassing a lamination type heat exchanger from the crevice between a protrusion piece and a slot, and flowing into a combustion gas exhaust port, heat exchanging efficiency falls. The purposes of this invention are to prevent plugging up mostly the slot formed in the peripheral part of a lamination type heat exchanger in the shape of airtightness, and combustion gas's bypassing a lamination type heat exchanger, and discharging it, to raise heat exchanging efficiency by that cause, etc.
[0009]
[Means for solving problem]In the heat exchange apparatus provided with the lamination type heat exchanger of the structure which the clearance sealing structure of the heat exchange apparatus of Claim 1 was allocated inside the case member which has a combustion gas inlet and a combustion gas exhaust port, and this case member, and laminated two or more channel formation boards, The blocking plate which takes up between a case member and lamination type heat exchangers was formed, and the comb tooth-form shaped part which formed two or more protrusion pieces projected into the slot of the plurality of the peripheral part of a lamination type heat exchanger to the lamination type heat-exchanger side of said blocking plate in the shape of **** was provided.
[0010]while the combustion gas introduced into the inside of a case member from the combustion gas inlet performs heat exchange for the channel formed in the inside of two or more channel formation boards between flowing fluid and fluid is heated -- two or more channel formation -- a wooden floor is passed and it is discharged from a combustion gas exhaust port in the exterior of a heat exchange apparatus. In order to prevent a part of combustion gas's bypassing a lamination type heat exchanger from this crevice, and that a crevice arises between a case member and a lamination type heat exchanger on manufacture of a heat exchange apparatus flowing into a combustion gas exhaust port here, although not avoided, The blocking plate which takes up between a case member and lamination type heat

exchangers is formed.

[0011]Although two or more slots are formed in the peripheral part of a lamination type heat exchanger with two or more laminated channel formation boards here, a part of combustion gas will bypass a lamination type heat exchanger and it will be discharged from two or more slots, Since the comb tooth-form shaped part which formed mostly the protrusion piece projected into the slot of these plurality in the shape of **** was provided in the tip end part by the side of the lamination type heat exchanger of a blocking plate, to it, these protrusion pieces can also close two or more slots, and between a case member and lamination type heat exchangers can be mostly taken up in the shape of airtightness to it. Therefore, it can stop that combustion gas bypasses a lamination type heat exchanger, and flows into a combustion gas exhaust port, and heat exchanging efficiency can be raised.

[0012]In the heat exchange apparatus provided with the lamination type heat exchanger of the structure which the clearance sealing structure of the heat exchange apparatus of Claim 2 was allocated inside the case member which has a combustion gas inlet and a combustion gas exhaust port, and this case member, and laminated two or more channel formation boards, Two or more blocking plates which take up between a case member and lamination type heat exchangers were formed, and the comb tooth-form shaped part which formed two or more protrusion pieces projected into the slot of the plurality of the peripheral part of a lamination type heat exchanger to the lamination type heat-exchanger side of two or more blocking plates in the shape of **** was provided, respectively.

[0013]The seal structure of this heat exchange apparatus is also constituted so that the comb tooth-form shaped part which formed mostly two or more protrusion pieces projected into two or more slots in the shape of **** like the invention of Claim 1 may close a slot and a blocking plate may close between a case member and lamination type heat exchangers. Here, it is necessary to make width of a protrusion piece narrower than the width of a slot so that two or more protrusion pieces may be made to project in two or more slots and factors, such as a manufacturing error, can close a slot, even if the width of these slots varies since the width of two or more slots is not necessarily constant. However, only by the comb tooth-form shaped part of the blocking plate of one sheet, since a crevice is made between a slot and a protrusion piece, a part of combustion gas will bypass a lamination type heat exchanger from the crevice, and it will flow into a combustion gas exhaust port.

[0014]Then, if two or more blocking plates are allocated so that two or more such blocking plates may be formed and the comb tooth-form shaped part of the blocking plate of these plurality may shift to the laminating direction of a channel formation board, Since the protrusion piece of another comb tooth-form shaped part can close the crevice even if a crevice is made between the protrusion piece of which comb tooth-form shaped part, and a slot, it can prevent nearly thoroughly combustion gas bypassing a lamination type heat exchanger from a slot, and

flowing into a combustion gas exhaust port.
[0015]In the invention of Claim 2, the clearance sealing structure of the heat exchange apparatus of Claim 3, [said two or more blocking plates] It was allocated so that it might be located in the position from which it was allocated by the state where two or more comb tooth-form shaped parts stuck selectively at least, and at least two comb tooth-form shaped parts shifted to the laminating direction of said channel formation board. Since it is necessary to make width of a protrusion piece narrower than the width of a slot, a crevice will exist between the protrusion piece of one certain comb tooth-form shaped part, and a slot, but. Since at least two comb tooth-form shaped parts have shifted to the laminating direction of the channel formation board, the protrusion piece of other comb tooth-form shaped parts allocated by shifting from the comb tooth-form shaped part can close the aforementioned crevice.
[0016]The clearance sealing structure of the heat exchange apparatus of Claim 4 is [this invention] characterized by that the invention of Claim 1 comprises the following.
Two or more slits located between the protrusion pieces of the plurality [blocking plate / said] of said comb tooth-form shaped part.
Two or more flections which are two or more flections formed in a slit and parallel at the position on extension of the slit of these plurality, and were crooked to the opposite side by turns.
Therefore, the protrusion piece can incline to the laminating direction of a channel formation board by the slit and the flection formed in parallel. That is, if form so that the width of the laminating direction of a protrusion piece may become somewhat larger than the width of a slot, where a comb tooth-form shaped part is lengthened to a laminating direction, and a comb tooth-form shaped part is made crooked in a flection and a protrusion piece is made to incline to a laminating direction, A protrusion piece wider than a slot can be made to be able to project in a slot, and a slot can be plugged up nearly thoroughly.
[0017]The clearance sealing structure of the heat exchange apparatus of Claim 5 comprised a thin metal plate in which the elastic deformation of at least one of said two or more blocking plates is possible at the time of the gas pressure increase of combustion gas in Claim 2 or the invention of 3. As mentioned above, although improvement in heat exchanging efficiency can be aimed at by taking up mostly between a case member and lamination type heat exchangers in the shape of airtightness, On the other hand, in an unstationary state of burning appliances if between a case member and lamination type heat exchangers is always taken up in the shape of airtightness, when changing the output of a burner, When the pressure fluctuation of combustion gas amplifies within a case member, the flame of a burner becomes unstable and there is a possibility that the phenomenon what is called of oscillating combustion in which apparatus provided with a heat exchange apparatus and this heat exchange apparatus itself resonates and vibrates may arise.

[0018]Then, with constituting at least one of two or more blocking plates from a thin metal plate, when gas pressure goes up by an unstationary state, the blocking plate which comprised a thin metal plate with the gas pressure which went up carries out elastic deformation, and a comb tooth-form shaped part is isolated from a slot. Therefore, a part of combustion gas will bypass a lamination type heat exchanger from a slot temporarily, and it will flow into a combustion gas exhaust port, and since the gas pressure which went up falls, it can control changing gas pressure sharply and generating of oscillating combustion can be prevented. If gas pressure falls, a blocking plate will be in the state where it returns to the original state and a comb tooth-form shaped part closes a slot, it will continue after a gas pressure fall, and combustion gas will not leak from a slot.

[0019]In the heat exchange apparatus provided with the lamination type heat exchanger of the structure which the clearance sealing structure of the heat exchange apparatus of Claim 6 was allocated inside the case member which has a combustion gas inlet and a combustion gas exhaust port, and this case member, and laminated two or more channel formation boards, The blocking plate which takes up between a case member and lamination type heat exchangers in order to prevent combustion gas's bypassing a lamination type heat exchanger, and flowing into a combustion gas exhaust port is formed, It is a coiled spring which can be elongated to the laminating direction of said channel formation board, the coiled spring which plugs up mostly two or more slots of the peripheral part of said lamination type heat exchanger in the shape of airtightness was formed, and the tip part by the side of the lamination type heat exchanger of said blocking plate was made to contact said coiled spring.

[0020]Instead of providing a comb tooth-form shaped part in a blocking plate like the invention of Claim 1, the coiled spring of two or more volumes which plugs up two or more slots in the shape of airtightness mostly between a case member and a lamination type heat exchanger is formed, Making the tip part by the side of the lamination type heat exchanger of a blocking plate contact this coiled spring can close mostly between a case member and lamination type heat exchangers in the shape of airtightness. Other operations are the same as that of Claim 1, and omit explanation.

[0021]

[Mode for carrying out the invention]An embodiment of the invention is described. This embodiment is an example which applied this invention to the latent-heat-recovery type heat exchange apparatus (secondary heat exchange apparatus) of hot water supply equipment. First, the hot water supply equipment 1 is explained briefly. As shown in drawing 1, the hot water supply equipment 1 is provided with the air blasting fan 5 grade which supplies combustion air also for the burner 2, the primary heat exchange apparatus 3 which collects the sensible heats of the combustion gas from this burner 2, and the latent heat of steam in combustion gas to the callable secondary heat exchange apparatus 4 and the burner 2. The

gas supply line 10 which supplies the fuel gas is connected to the burner 2.
[0022]As shown in drawing 1 and drawing 2, the feed pipe 11 is connected to the water supply opening 32 of the secondary heat exchange apparatus 4, and, on the other hand, the connecting pipe 12 which connects the primary heat exchange apparatus 3 and the secondary heat exchange apparatus 4 is connected to the warm water delivery port 33. With the secondary heat exchange apparatus 4, heat exchange of the water supplied to the secondary heat exchange apparatus 4 from the feed pipe 11 is carried out, it is heated between the combustion gas of the low temperature which flows in from the primary heat exchange apparatus 3, and is sent to the primary heat exchange apparatus 3 via the connecting pipe 12. Further, between the hot combustion gas of the burner 2, heat exchange of the warm water which flowed into the primary heat exchange apparatus 3 is carried out, it is heated, and hot water supply is carried out from the tapping pipe 13 to equipment of versatility, such as a kitchen and a bath.
[0023]Next, the secondary heat exchange apparatus 4 is explained in detail. It is provided, in order that this secondary heat exchange apparatus 4 may perform heat exchange between the combustion gas with which the temperature after carrying out heat exchange to warm water with the primary heat exchange apparatus 3 fell, and water before going into the primary heat exchange apparatus 3, may also collect the latent heat of steam in combustion gas and may raise heat exchanging efficiency. As shown in drawing 3 and drawing 4, the secondary heat exchange apparatus 4 is provided with the following.
The case member 20 which has the combustion gas inlet 20a and the combustion gas exhaust port 20b.
The lamination type heat exchanger 21 (henceforth the heat exchanger 21) of the structure which was allocated inside this case member 20, and laminated two or more channel formation boards 30.

[0024]The combustion gas inlet 20a for introducing combustion gas from the primary heat exchange apparatus 3 is formed in the rear end part of the case member 20, and the combustion gas exhaust port 20b for discharging combustion gas outside is formed in the front end part of the case member 20. The upper limit of the case member 20 is closed by the top plate 22. The sole plate 23 of the case member 20 inclines so that the water in which steam condensed and was generated inside the case member 20 may flow into the front and may fall, and the drain exhaust pipe 24 prolonged below is formed in the front end part of the sole plate 23. Since the flocculated water generated inside the case member 20 shows acidity including the nitrogen oxides in combustion gas, and SOx, after being neutralized by the neutralizing device (graphic display abbreviation) connected to the drain exhaust pipe 24, it is discharged outside.

[0025]As shown in drawing 3 - drawing 6, the heat exchanger 21 has the structure which laminated two or more channel formation boards 30 which have the channel 36 through which warm water flows into an inside forward and backward. The channel formation board 30 of these plurality is joined by vacuum furnace soldering using the brazing material of a copper alloy, etc. As shown in drawing 5, two or more these-laminated channel formation boards 30 are inserted between the end plates 31 on either side, and the water supply opening 32 and the warm water delivery port 33 are formed in the left end channel formation board 30. Among two or more laminated channel formation boards 30, the outer fin 34 for combustion gas to flow into a lower part from the upper part, and enlarge the heat transfer area by the side of combustion gas between these channel formation boards 30 is infixed.
[0026]As shown in drawing 5 and drawing 6, [the channel formation board 30] Pile up the plate members 30a and 30b of two sheets, and these plate members 30a and 30b are joined by vacuum furnace soldering, [among the plate members 30a and 30b of these two sheets] The stream admission into a club 35 into which water flows from the water supply opening 32, the channel 36 of U type formed so that the water which flowed from this stream admission into a club 35 might flow into the arrow direction of drawing 6, and the warm water discharge section 37 which sends out the warm water heated passing along the channel 36 to the warm water delivery port 33 are formed. The inner fin 38 for enlarging the heat transfer area by the side of warm water is formed in the channel 36. As shown in drawing 5 and drawing 6, it has the caulking part 39 which each channel formation board 30 is formed of the peripheral part of the plate members 30a and 30b of two sheets, and is projected outside, and two or more slots 40 are formed in the peripheral part of the heat exchanger 21 of the caulking part 39 of the channel formation board 30 of these plurality.
[0027]In this heat exchanger 21, after it is heated by the heat exchange between combustion gas, the water introduced from the water supply opening 32 having branched to the channel 36 of each channel formation board 30, and passing along that channel 36, it joins again and is sent to the primary heat exchange apparatus 3 from the warm water delivery port 33. On the other hand, the combustion gas introduced into the inside of the case member 20 from the combustion gas inlet 20a flows into a lower part from the upper part between the channel formation boards 30 laminated heating the warm water which flows through the channel 36 as the arrow head of the continuous line of drawing 4 shows, and is discharged from the combustion gas exhaust port 20b outside. Above the heat exchanger 21, the clearance sealing structure 50 of the following ** which closes a crevice is established in between the case member 20 and the heat exchangers 21 so that combustion gas may bypass the heat exchanger 21 and may not flow into the combustion gas exhaust port 20b.
[0028]Next, the clearance sealing structure 50 peculiar to an application concerned is explained. This clearance sealing structure 50 is for preventing flowing into the combustion gas

exhaust port 20b, without a part of combustion gas carrying out heat exchange to warm water by the heat exchanger 21 through that crevice, as the crevice between the heat exchanger 21 and the case member 20 is closed and the arrow head of a dotted line shows to drawing 4.

[0029]As shown in drawing 3 and drawing 4, the clearance sealing structure 50 has the blocking plates 51 and 52 made from SUS304 of two sheets, before and after taking up between the case member 20 and the heat exchangers 21, in order to prevent combustion gas's bypassing the heat exchanger 21 and flowing into the combustion gas exhaust port 20b. Board thickness is comparatively thick (for example, 0.5 mm), and, on the other hand, as for the blocking plate 51 by the side of front, the front end portion comprises easily a thin strip (for example, 0.05 mm of board thickness) in which elastic deformation is possible, as for the blocking plate 52 on the backside.

[0030]To the heat exchanger 21, the blocking plate 51 by the side of front is attached to the case member 20 so that regulation of the position of a horizontal direction is possible, and it is allocated so that the state where it curved so that it might hang down from the front to back may close the crevice between the case member 20 and the heat exchanger 21. On the other hand, the blocking plate 52 on the backside is allocated so that the state where it curved so that it might hang down from back to the front may close the crevice between the case member 20 and the heat exchanger 21. The blocking plates 51 and 52 of these two sheets are pushed against the heat-exchanger 21 side by the top plate 22, and the position of a sliding direction does not shift inside the case member 20.

[0031]Although the blocking plates 51 and 52 of these two sheets can close most crevices between the case member 20 and the heat exchanger 21, with the blocking plates here, As mentioned above, since two or more slots 40 are formed in the peripheral part of the heat exchanger 21, if the slot 40 of these plurality is not plugged up, either, a part of combustion gas will flow out of two or more slots 40 into the combustion gas exhaust port 20b. Therefore, as shown in drawing 7 - drawing 10, [the tip end part by the side of the heat exchanger 21 of the blocking plates 51 and 52 of two sheets] In order for the blocking plates 51 and 52 of two sheets to close mostly two or more slots 40 of the peripheral part of the heat exchanger 21 in the shape of airtightness, the comb tooth-form shaped parts 53 and 54 which formed mostly two or more protrusion pieces 53a and 54a projected into two or more slots 40 in the shape of **** are formed, respectively. The flection 53b crooked back is formed in the tip part of the protrusion piece 53a of the comb tooth-form shaped part 53 of the blocking plate 51 by the side of front.

[0032]As shown in drawing 8 - drawing 10, in two or more slots 40, the protrusion piece 53a of the blocking plate 51 by the side of front is in the state which projected in the slot 40 and contacted the surface part of the heat exchanger 21, and it is allocated by the state where the protrusion piece 54a of the blocking plate 52 on the backside sticks to the flection 53b of the

protrusion piece 53a. The two comb tooth-form shaped parts 53 and 54 are allocated so that it may be located in the position which shifted to the horizontal direction (laminating direction of the channel formation board 30). For example, what is necessary is to bring near the comb tooth-form shaped part 54 of the blocking plate 52 on the backside by left-hand side, and just to allocate it, while bringing near the comb tooth-form shaped part 53 of the blocking plate 51 by the side of front by right-hand side and allocating it.

[0033]Here the width of the horizontal direction of two or more slots 40 by factors, such as a manufacturing error, since the width of two or more slots 40 is not necessarily constant, Even if the width of these slots 40 varies, the width of the protrusion pieces 53a and 54a of these comb tooth-form shaped parts 53 and 54 is formed a little more narrowly than the width of the slot 40 so that two or more protrusion pieces 53a and 54a may be made to project in two or more slots 40 and the slot 40 can be plugged up. Therefore, as shown in drawing 10, since the crevice d between horizontal directions arises between the slot 40 and the protrusion piece 53a, combustion gas will leak from this crevice d only by making the protrusion piece 53a of one of the two's comb tooth-form shaped part 53 project in the slot 40. However, since another protrusion piece 54a is allocated by the position which shifted to the horizontal direction to the protrusion piece 53a, the crevice d is closed by this protrusion piece 54a.

[0034]As mentioned above, since it comprises a thin strip, when the output of the burner 2 is changed, as the broken chain line of drawing 9 shows, at the time of the gas pressure increase of the combustion gas in an unstationary state, elastic deformation of the blocking plate 52 on the backside is carried out so that the comb tooth-form shaped part 54a may come floating. Then, the crevice d closed with the protrusion piece 54a is opened wide momentarily, and a part of combustion gas flows into the combustion gas exhaust port 20b through this crevice d.

[0035]Next, an operation and effect of the clearance sealing structure 50 are explained. Since between the case member 20 and the heat exchangers 21 is mostly closed by the blocking plates 51 and 52 of two sheets if combustion gas is introduced into the secondary heat exchange apparatus 4 from the combustion gas inlet 20a as shown in drawing 4, It is discharged from the combustion gas exhaust port 20b through between two or more channel formation boards 30 in the exterior of the secondary heat exchange apparatus 4, a great portion of combustion gas heating warm water, as the arrow head of the continuous line of drawing 4 shows.

[0036]Although the slot 40 is formed in the peripheral part of the heat exchanger 21 with two or more laminated channel formation boards 30 here, a part of combustion gas will bypass the heat exchanger 21 through the slot 40 of these plurality and it will flow into the combustion gas exhaust port 20b, Since the protrusion pieces 53a and 54a of the comb tooth-form shaped parts 53 and 54 have projected in two or more slots 40, it can stop that combustion gas leaks from the slot 40.

[0037]The width of the horizontal direction of the protrusion pieces 53a and 54a is narrower than the width of the slot 40, for example, as shown in drawing 10, where the protrusion piece 53a is inserted into the slot 40, the crevice d arises between the protrusion piece 53a and the slot 40, but. Since the protrusion piece 54a of another side can close this crevice d, the two comb tooth-form shaped parts 53 and 54 can close two or more slots 40 in the shape of airtightness mostly. Therefore, it can stop being discharged from the combustion gas exhaust port 20b, without carrying out heat exchange of the combustion gas by the heat exchanger 21 as much as possible, and heat exchanging efficiency can be raised.
[0038]Since the blocking plate 52 on the backside comprises a thin strip in which elastic deformation is possible at the time of the gas pressure increase of combustion gas, When the output of the burner 2 is changed and the gas pressure of combustion gas goes up in an unstationary state, elastic deformation is carried out so that the comb tooth-form shaped part 54 may come floating, as the broken chain line of drawing 9 shows with a rise of the gas pressure, and the crevice d closed with the protrusion piece 54a is opened wide momentarily.
[0039]Therefore, since a part of combustion gas flows into the combustion gas exhaust port 20b through the crevice d and gas pressure falls, oscillating combustion can be prevented from controlling that change of gas pressure amplifies, and the flame of the burner 2 becoming unstable, and arising in the hot water supply equipment 1. Since gas pressure will fall shortly after combustion gas flows through the crevice d momentarily, the comb tooth-form shaped part 54 which carried out elastic deformation returns, again, after gas pressure falls, the crevice d will be in the state where it was closed, and it continues, and combustion gas does not leak from the slot 40.
[0040]Next, the change form which added various change to said embodiment is explained. However, about what has the same composition as said embodiment, the same numerals are attached and the explanation is omitted suitably. 1] As shown in drawing 11. [both both / any one place or / above a part which the comb tooth-form shaped parts 53 and 54 stick selectively] It has two or more slits 60a corresponding to the caulking part 39 as shown in drawing 12, and the sealing member 60 excellent in corrosion resistance made of a synthetic resin (for example, product made from PTFE) may be formed. Or the sealing member 60 may be infixed between the two comb tooth-form shaped parts 53 and 54. In addition to the comb tooth-form shaped parts 53 and 54 of two sheets, the fuel gas can be further prevented from flowing into the combustion gas exhaust port 20b from the slot 40 nearly thoroughly by plugging up the slot 40 with this sealing member 60.
[0041]When it constitutes like said embodiment so that the comb tooth-form shaped part 54 of the blocking plate 52 may carry out elastic deformation at the time of gas pressure increase and combustion gas may flow through the slot 40 momentarily in order to prevent oscillating combustion, Two or more slits 61a which correspond to the caulking part 39 as shown in

drawing 13, What is necessary is to use the sealing member 61 which has the opening 61b, and just to make it combustion gas flow into the combustion gas exhaust port 20b momentarily via the opening 61b, when the blocking plate 52 carries out elastic deformation and the comb tooth-form shaped part 54 comes floating.

[0042]2] As shown in drawing 14, form the flection 74b crooked to the front in the protrusion piece 74a of the comb tooth-form shaped part 74 of the blocking plate 72 on the backside, and, [in the slot 40] [the state where the protrusion piece 74a on the backside was made to contact the heat exchanger 21] It may allocate so that the protrusion piece 73a of the comb tooth-form shaped part 73 of the blocking plate 71 by the side of front may stick to the top face of the flection 74b of the protrusion piece 74a on the backside.

[0043]4] One of the two is also omissible among the blocking plates 51 and 52 of two sheets. in this case, if it compares when not plugging up the slot 40 of that through which a little combustion gas will flow into the combustion gas exhaust port 20b from the crevice d shown in drawing 10 in order for the comb tooth-form shaped part of the blocking plate of one sheet to close two or more slots 40, it can be markedly alike and heat exchanging efficiency can be raised.

[0044]When the blocking plate of one sheet closes a crevice, as shown in drawing 15 and drawing 16, Two or more slits 81b to which this blocking plate 80 is located among two or more protrusion pieces 81a of the comb tooth-form shaped part 81, and corresponds to two or more caulking parts 39 of the heat exchanger 21, It is two or more flections 81c formed in the position on extension of the slit 81b of these plurality in parallel with the slit 81b, and it can also constitute so that it may have two or more flections 81c crooked to the opposite side by turns.

[0045]With constituting in this way, as shown in drawing 16, the protrusion piece 81a can incline up and down to a horizontal direction by the flection 81c formed in parallel with the slit 81b. That is,. [the comb tooth-form shaped part 81] [the state where it lengthened right and left] It forms so that the width of the right and left of the protrusion piece 81a may become larger than the width of the slot 40, Since the protrusion piece 81a can be inserted in the slot 40 in the state where made the comb tooth-form shaped part 81 crooked in the flection 81c, and the protrusion piece 81a was made to incline to a horizontal direction, Even when the width of the horizontal direction of the slot 40 varies by factors, such as a manufacturing error, the protrusion piece 81a can close the slot 40 in the shape of airtightness mostly.

[0046]5] The blocking plate 91 which takes up between the case member 20 and the heat exchangers 21 as shown in drawing 17 and drawing 18, It is the coiled spring 92 which can be elongated to a horizontal direction, the coiled spring 92 which plugs up mostly the slot 40 of the peripheral part of the heat exchanger 21 in the shape of airtightness may be formed, and the clearance sealing structure 90 may be constituted so that the tip part by the side of the heat exchanger 21 of the blocking plate 91 may be made to contact the coiled spring 92. Therefore,

since the coiled spring 92 can be made to be able to expand and contract and some coiled springs 92 can be stuffed into two or more slots 40 even when the width of the horizontal direction of the slot 40 varies by factors, such as a manufacturing error, the slot 40 can be mostly plugged up in the shape of airtightness, and heat exchanging efficiency can be raised.
[0047]
[Effect of the Invention]According to the invention of Claim 1, in order to prevent a part of combustion gas's bypassing a lamination type heat exchanger from between a case member and lamination type heat exchangers, and flowing into a combustion gas exhaust port, a blocking plate can close between a case member and lamination type heat exchangers. Since the comb tooth-form shaped part which formed mostly the protrusion piece projected into the slot of these plurality to the tip end part by the side of the lamination type heat exchanger of a blocking plate in the shape of **** was provided, These protrusion pieces can also close two or more slots of the peripheral part of a lamination type heat exchanger, and between a case member and lamination type heat exchangers can be mostly taken up in the shape of airtightness. Therefore, it can stop combustion gas bypassing a lamination type heat exchanger from a slot, and flowing into a combustion gas exhaust port, and heat exchanging efficiency can be raised.
[0048]In order for two or more blocking plates to close mostly two or more slots of the peripheral part of a lamination type heat exchanger in the shape of airtightness according to the invention of Claim 2, Since the comb tooth-form shaped part which formed mostly two or more protrusion pieces projected into two or more slots to the tip end part by the side of the lamination type heat exchanger of two or more blocking plates in the shape of **** was provided, respectively, the following effects are acquired.
[0049]Since the width of two or more slots is not necessarily constant, even when the width of the slot varies, in order to make a protrusion piece project in a slot by factors, such as a manufacturing error, it is necessary to make width of a protrusion piece narrower than the width of a slot but, and. [allocating two or more blocking plates so that the comb tooth-form shaped part of two or more blocking plates may shift to the laminating direction of a channel formation board] Since the protrusion piece of another comb tooth-form shaped part which shifted with the comb tooth-form shaped part, and was allocated can close the crevice produced between the protrusion piece of a comb tooth-form shaped part, and a slot, It can prevent nearly thoroughly combustion gas bypassing a lamination type heat exchanger from a slot, and flowing into a combustion gas exhaust port, and heat exchanging efficiency can be raised.
[0050]Since according to the invention of Claim 3 two or more blocking plates were allocated so that it might be located in the position from which it was allocated by the state where two or more comb tooth-form shaped parts stuck selectively at least, and at least two comb tooth-form

shaped parts shifted to the laminating direction of said channel formation board, The protrusion piece of the comb tooth-form shaped part allocated by the position which shifted to the comb tooth-form shaped part and laminating direction can close the crevice between the protrusion piece of a comb tooth-form shaped part and slot which are produced by having made width of the protrusion piece narrower than the width of a slot.

[0051]According to the invention of Claim 4, the protrusion piece can incline to the laminating direction of a channel formation board by the slit and the flection formed in parallel. [therefore the thing which form so that the width of said laminating direction of a protrusion piece may become somewhat larger than the width of a slot, where a comb tooth-form shaped part is lengthened to a laminating direction, and you make a comb tooth-form shaped part crooked in a flection, and is made for a protrusion piece to incline to said laminating direction] A wide projection part can be made to be able to project in a slot, and a protrusion piece can close a slot in the shape of airtightness mostly. In addition, the same effect as Claim 1 is acquired.

[0052]According to the invention of Claim 5. [at least one of two or more blocking plates] In an unstationary state of a burner, since it comprised a thin metal plate in which elastic deformation is possible at the time of the gas pressure increase of combustion gas, when the gas pressure of combustion gas goes up, the blocking plate which comprised a thin metal plate with the gas pressure which went up carries out elastic deformation, and a comb tooth-form shaped part is isolated from a slot. Therefore, combustion gas will bypass a lamination type heat exchanger from a slot temporarily, it will escape to a combustion gas exhaust port, the gas pressure which went up can fall, and generating of oscillating combustion can be controlled. Since a blocking plate will return to the original state if gas pressure falls, after gas pressure falls, it returns to the state where a comb tooth-form shaped part plugs up a slot, and it continues, and combustion gas does not leak from a slot. In addition, Claim 2 or the same effect as 3 is acquired.

[0053][according to the invention of Claim 6, forming the coiled spring of two or more volumes which plugs up two or more slots in the shape of airtightness mostly between a case member and a lamination type heat exchanger, and making the tip part by the side of the lamination type heat exchanger of a blocking plate contact this coiled spring] Since between a case member and lamination type heat exchangers can be mostly taken up in the shape of airtightness, it can stop that combustion gas bypasses a lamination type heat exchanger, and flows into a combustion gas exhaust port, and heat exchanging efficiency can be raised.

[Brief Description of the Drawings]

[Drawing 1]It is an outline lineblock diagram of the hot water supply equipment concerning the

embodiment of this invention.

[Drawing 2]It is a side elevation of the primary secondary heat exchange apparatus.

[Drawing 3]It is a front view of a secondary heat exchange apparatus.

[Drawing 4]It is a side elevation of drawing 3.

[Drawing 5]It is a front view of a lamination type heat exchanger.

[Drawing 6]It is a side elevation of drawing 5.

[Drawing 7]It is a top view of a blocking plate.

[Drawing 8]It is a partial top view of the comb tooth-form shaped part in the state where the slot is plugged up.

[Drawing 9]It is an IX-IX line sectional view of drawing 8.

[Drawing 10]It is X-X-rays **** figure of drawing 9.

[Drawing 11]It is the drawing 9 equivalent figure of a change form.

[Drawing 12]It is a partial top view of a sealing member.

[Drawing 13]It is a partial top view of a sealing member.

[Drawing 14]It is the drawing 9 equivalent figure of a change form.

[Drawing 15]It is the drawing 10 equivalent figure of a change form.

[Drawing 16]It is a XVI-XVI line sectional view of drawing 15.

[Drawing 17]It is an important section enlarged drawing of the heat exchanger in the state where the coiled spring in a change form closed the slot.

[Drawing 18]It is a XVIII-XVIII line sectional view of drawing 17.

[Explanations of letters or numerals]

4 Secondary heat exchange apparatus

20 Case member

20a Combustion gas inlet

20b Combustion gas exhaust port

21 Lamination type heat exchanger

30 Channel formation board

40 Slot

50, 90 clearance sealing structures

51, 52, 71, 72, 80, and 91 Blocking plate

53, 54, 73, 74, and 81 Comb tooth-form shaped part

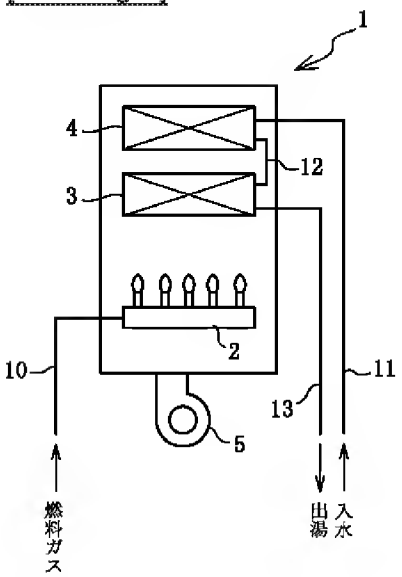
53a, 54a, 73a, 74a, and 81a Protrusion piece

81b Slit

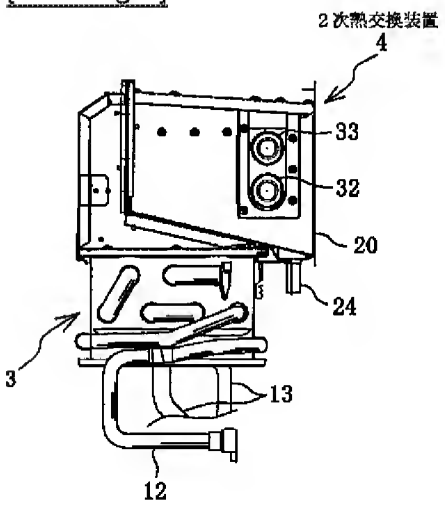
81c Flection

92 Coiled spring

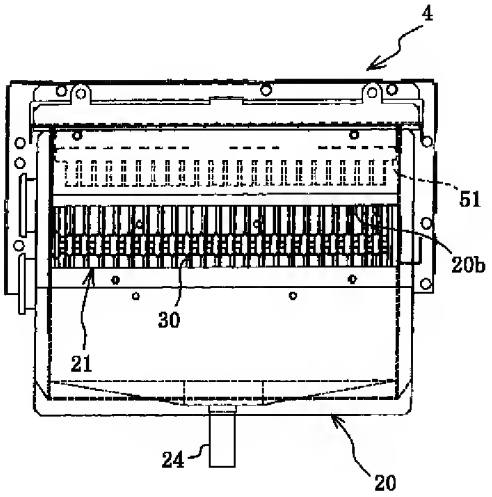
[Drawing 1]



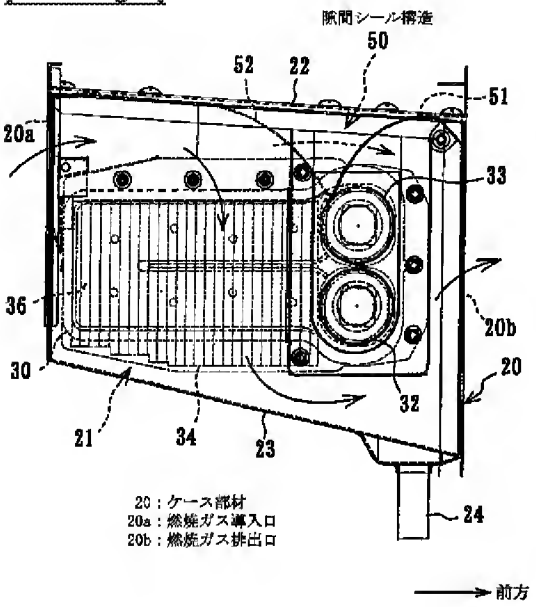
[Drawing 2]



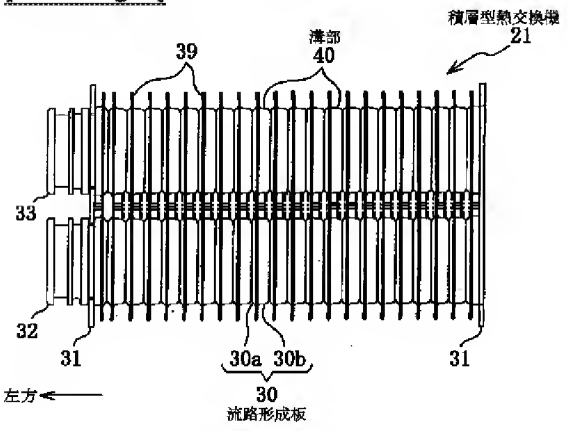
[Drawing 3]



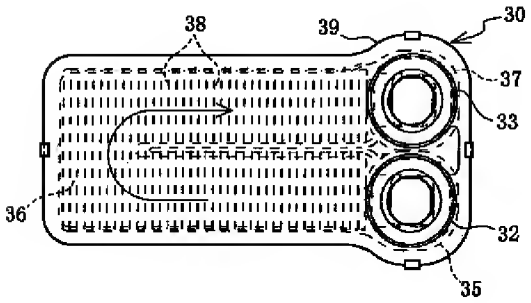
[Drawing 4]



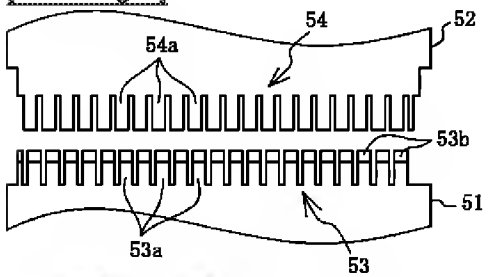
[Drawing 5]



[Drawing 6]

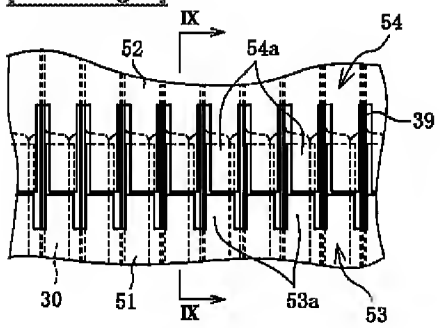


[Drawing 7]

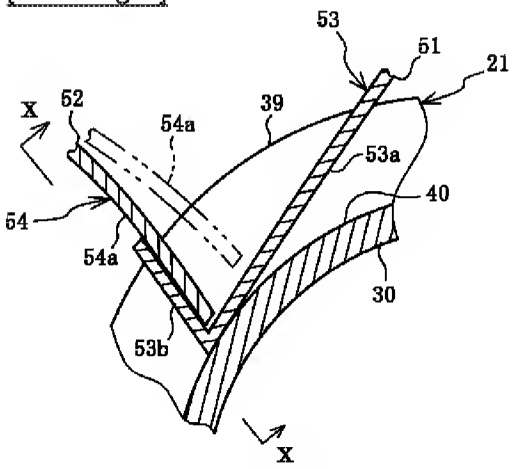


51, 52：閉塞板　53, 54：櫛歯形状部　53a, 54a：突出片

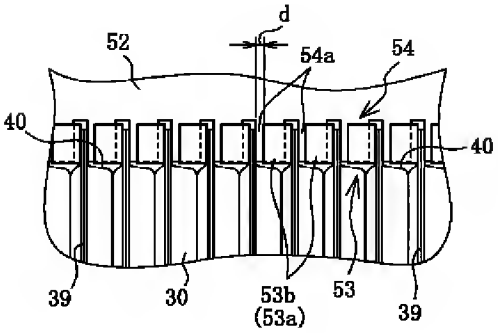
[Drawing 8]



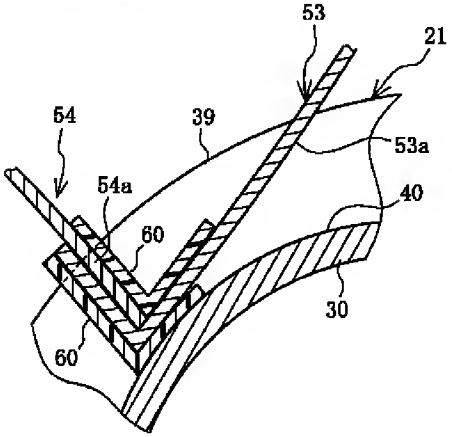
[Drawing 9]



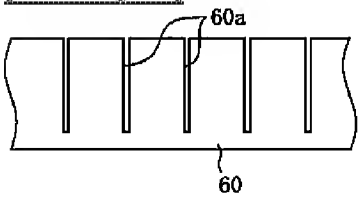
[Drawing 10]



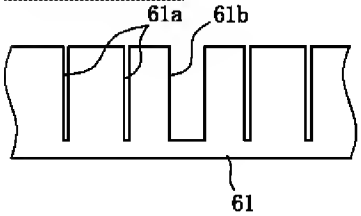
[Drawing 11]



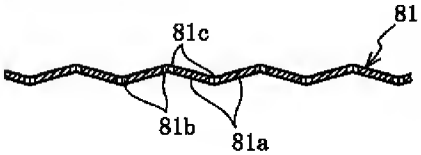
[Drawing 12]



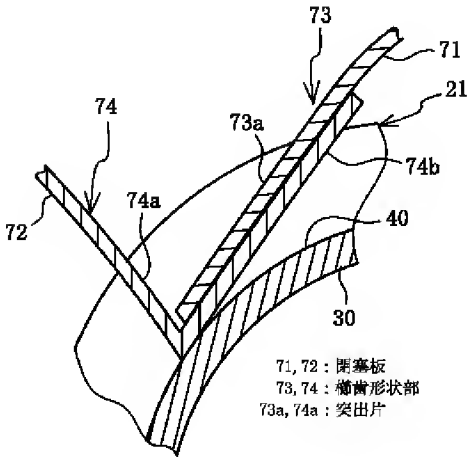
[Drawing 13]



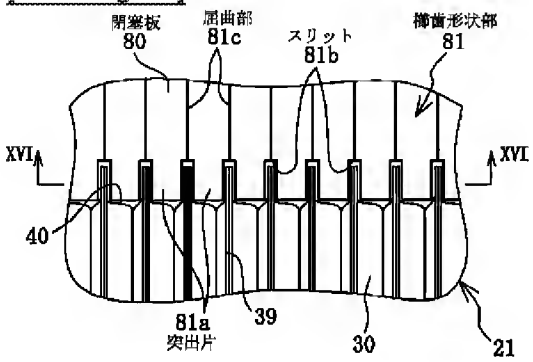
[Drawing 16]



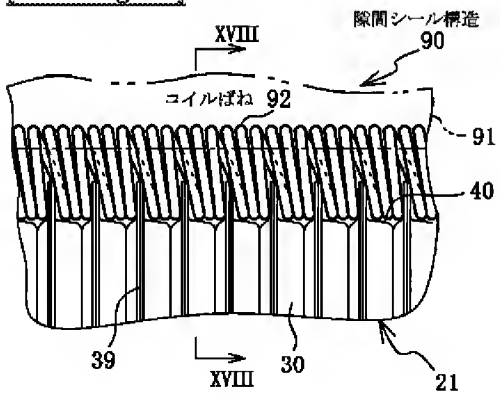
[Drawing 14]



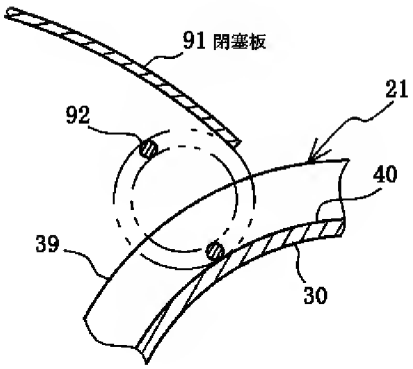
[Drawing 15]



[Drawing 17]



[Drawing 18]



[Translation done.]